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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/639,551 | 08/16/2000 | Youhong Lu | 00-335 | 3281 |

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| EXAMINER | |
|---|---|
| NGUYEN, ALAN V | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2662 | 4 |

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/639,551 | LU, YOUHONG | |
| | Examiner | Art Unit | |
| | Alan Nguyen | 2662 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 08/16/00 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

### *Information Disclosure Statement*

1. The information disclosure statement filed 08/16/2000 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Copies of the following references are needed: Ref. Des. A1-A7. C1-C9

### *Specification*

2. The disclosure is objected to because of the following informalities:

On page 12, line 8, "adaptive filer 44" should read --adaptive filter 44--.

On page 18, lines 8 and 9, "filter 44 is to estimates" should read --filter 44 estimates--.

On page 21, line 7, "determination in" should read --determination is--.

Appropriate correction is required.

### *Claim Objections*

3. Claims 7, 10, and 13 are objected to because of the following informalities:

Claim 7, line 6, "A echo" should read --An echo--.

Claim 10, line 13, "based up said" should read --based upon said--.

Claim 13, line 1, "of a echo" should read --of an echo--.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 3 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "said predetermined characteristics" in line 16. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Hemkumar (US 6,434,110).

Regarding **claims 1 and 6**, Hemkumar discloses a method of controlling the operation of an echo canceller and computer readable medium having stored instructions for a processing unit to execute the following method ***("...A digital signal processor (DSP) with RAM and program ROM. The DSP executes acoustic***

***processing routines such as adaptive filtering", see column 4, lines 1-5)***

comprising the steps of:

receiving a far-end signal ***(see figure 1, element 124; "The far end input terminal NI", see column 4, line 60)*** and determining whether said far-end signal is representative of a modulated signal ***("The signal generated by the network input HPF is processed to determine a parameter, called the far-end input power", see column 5, line 33-35; "A speech event is detected when a power estimation level rises above the background noise level by a defined threshold", see column 11, lines 46-48)***;

receiving a near-end signal ***(see figure 1, element 122; "the microphone input terminal API is called near-end connection", see column 4, line 34-40)*** and determining whether said near-end signal is representative of a modulated signal ***("The signal generated by the acoustic input HPF is processed to determine a parameter, called the near-end input power", see column 6, line 24-26; "A speech event is detected when a power estimation level rises above the background noise level by a defined threshold", see column 11, lines 46-48)***;

determining whether said echo canceller will converge for said far-end signal ***("The ERLE of the echo canceller is measured with the far end output terminal NO", see column 16, line 14-16; "Measuring the time duration for the ERLE to reach a threshold level", see column 33, lines 44-47. This "measuring" explains convergence determination for the far-end signal)***;

controlling the operation of said echo canceller in response to said step of determining convergence ***("If the peak ERLE is greater than or equal to the threshold, then a declare echo path present block allows continued use of the echo canceller...Otherwise, the declare echo path absent block disables the echo canceller", see column 17, lines 66-67 and column 18, lines 1-9)*** and in response to said steps of determining whether said far-end and near-end signals are modulated signals ***("Far-end input power... is the power estimate of the far-end signal", see column 5, lines 43-44; "The near-end input power is the power estimate of the near-end input signal" see column 6, lines 35-36; "A speech event is detected when a power estimate level rises above the background noise level by a defined threshold", see column 11, lines 46-48; Essentially, the power estimated levels of the near-end and far-end signals are processed and fed to a comparator 388, which controls and can send signals to inhibit or activate the adaptive filter, see column 13, lines 45-53)***.

Regarding **claim 2**, with the features in parent claim 1 addressed above, Hemkumar discloses wherein the receiving steps use a high-pass filter to determine the characteristics of said near-end and far-end signals ***(see figure 1, element 126; "The signal generated by the network input high-pass filter is processed to determine a parameter, called the far-end input power...that is used in suppression", see column 5, lines 33-35; "The signal generated by the acoustic input high-pass filter is processed to determine a parameter, called the near-end input power", see column 6, lines 24-26)***.

Regarding **claim 3**, with the features in parent claim 1 addressed above, Hemkumar discloses wherein the predetermined characteristics include the frequency characteristics of the signals ***("The various power estimates such as fe_in_pow, ne_in_power are determined from peak-detecting power estimators which employ a single-pole infinite impulse response (IIR) filter", see column 6, lines 40-47; Using a single-pole IIR filter is indicative of utilizing frequency characteristics)***.

Regarding **claim 4**, with the features in parent claim 1 addressed above, Hemkumar discloses wherein the echo canceller includes an adaptive filter ***(see figure 2, element 208)*** and step of controlling the operation of said echo canceller includes freezing the adaptation of the adaptive filter ***("Then a declare echo path present block allows continued use of the echo canceller", see column 18, lines 1-3; "...is set to a freeze position to cause the adaptive filter coefficients to hold current values", see column 34, lines 64-65)***.

Regarding **claim 5**, with the features in parent claim 1 addressed above, Hemkumar discloses wherein the echo canceller includes an adaptive filter ***(see figure 2, element 208)*** and step of controlling the operation of said echo canceller includes deactivating the echo canceller ***("...the peak ERLE is less than the ERLE threshold and a declare echo path absent block 616 designates that the echo path is absent and disables the echo canceller", see column 18, lines 5-9)***.

Regarding **claim 7 and 12**, Hemkumar discloses a network comprising:

a first user device ***(microphone)***;

a first communication link coupled to said first user device ***(figure 1, element***

***122; "a full-duplex speakerphone integrated circuit is connected to receive a signal from a microphone (not shown)", see column 4, lines 32-34)***;

a hybrid circuit ***(see figure 1, element 100)***, said hybrid circuit comprising an echo canceller ***(element 128)***, said hybrid circuit coupled to a second communication link ***(element 124; "Signal at output terminal is sent to a telephone line (not shown)", see column 4, lines 54-56)***, wherein the said echo canceller comprises:

means for receiving a near-end signal ***(see figure 1, element 122; "the microphone input terminal API is called near-end connection", see column 4, line 34-40)*** and means for receiving a far-end signal ***(see figure 1, element 124; "the far end input terminal NI", see column 4, line 60)***, whereby said near-end signal includes an echo of said far-end signal ***(Figure 2 shows an echo path 214 going into the microphone 206 to form a transmit path 204. "A transmit path is the signal path from the near-end input...far-end signals are filtered using an adaptive filter 208 and subtracted from near-end signals at summing node 212", see column 7, lines 21-25)***;

determination means, coupled to said near and far-end signals, for determining whether said near-end and far end signals are not speech signals ***("Far-end input power... is the power estimate of the far-end signal", see column 5, lines 43-44; "The near-end input power is the power estimate of the near-end input signal", see column 6, lines 35-36; "A speech event is detected when a power estimate level rises above the background noise level by a defined threshold", see column 11, lines 46-48)***;

an adaptive filter, coupled to said far-end signal ***(see figure 2, element 208; see figure 2 element 202; "A receive path 202 is the signal path from the far-end input to the near-end output", see column 7, lines 16-19)***, said adaptive filter using a predetermined algorithm to produce an estimate of an echo ***( "Adaptive filter 208 uses a Normalized Least Mean Squared (NLMS) update algorithm to learn the echo path transfer function", see column 9, lines 53-55)***;

subtraction mean for subtracting out said estimate from said near-end signal ***(see figure 2, element 212; "Far-end signals... are filtered using an adaptive filter and subtracted from the near-end signal at an acoustic summing node 212", see column 7, lines 22-25)***;

control means ***(see figure 2, element 254)***, coupled to said near-end signal ***(element 204)***, and far-end signal ***(element 202)***, and said determination means ***(element $R_{es}(k)$)***, wherein said control means adjusts the operation of said adaptive filter based upon the characteristics of said near and far-end signals ***(The echo canceller uses a double-talk detector 254 to determine when to update the transfer function for the adaptive filter, see column 8, lines 46-54. The double-talk detector can permit adaptive filter updates or can block adaptive filter update by sending an inhibit signal to the adaptive filter via inhibit line 292, see column 9, lines 14-16)***.

Regarding **claim 8**, with the features in parent claim 7 addressed above, Hemkumar discloses wherein the control means determines the divergence of the adaptive filter ***( "Non-stationary noise leads to leaking of perceptible echo to the***

***far-end listener. For example, if background noise suddenly attenuates, clearly perceptible residual echo that was previously masked by the noise leaks to the far-end listener until the echo canceller reconverges to accommodate a new noise floor", see column 9, lines 3-7; This "residual echo" is a consequence of the adaptive filter diverging. "The double-talk detector operates to control the time that coefficient updates are performed", see column 9, lines 18-35)***.

Regarding **claim 9**, with the features in parent claim 7 addressed above, Hemkumar discloses wherein the control means selectively deactivates said adaptive filter based upon said characteristics of said near and far-end signals ***("Far-end input power... is the power estimate of the far-end signal", see column 5, lines 43-44; "The near-end input power is the power estimate of the near-end input signal", see column 6, lines 35-36; "A speech event is detected when a power estimate level rises above the background noise level by a defined threshold", see column 11, lines 46-48; Essentially, the power estimated levels of the near-end and far-end signals are processed and fed to a comparator 388, which controls and can send signals to inhibit or activate the adaptive filter, see column 13, lines 45-53)***.

Regarding **claim 10**, with the features in parent claim 7 addressed above, Hemkumar discloses wherein the control means selectively freezes the adaptation of said adaptive filter based upon said characteristics of said near-end and said far-end signals ***("Far-end input power... is the power estimate of the far-end signal", see column 5, lines 43-44; "The near-end input power is the power estimate of the near-end input signal", see column 6, lines 35-36; "A speech event is detected***

***when a power estimate level rises above the background noise level by a defined threshold", see column 11, lines 46-48; Essentially, the power estimated levels of the near-end and far-end signals are processed and fed to a comparator 388, which controls and can send signals to inhibit or activate the adaptive filter, see column 13, lines 45-53)***.

Regarding **claim 11**, with the features in parent claim 7 addressed above, Hemkumar discloses wherein the adaptive filter uses a least mean square (LMS) algorithm ***("Adaptive filter 208 uses a Normalized Least Mean Squared (NLMS) update algorithm to learn the echo path transfer function", see column 9, lines 53-55; NLMS utilizes a least mean square algorithm)***.

Regarding **claim 13**, Hemkumar discloses an echo canceller control module comprising:

means for receiving a far-end signal ***(see figure 1, element 124; "The far end input terminal NI", see column 4, line 60)*** and means for receiving a near-end signal ***(see figure 1, element 122; "The microphone input terminal API is called near-end connection", see column 4, line 34-40)***;

means for determining whether said near and far end signals have predetermined characteristics ***( "The far-end input power is the power estimate of the far-end input signal the network error power estimate is the power estimate of the signal produced by the summing node 130. The difference signal produced by the summing node is fed back to the network echo canceller to control the operation of the network echo canceller", see column 5, lines 43-50)***;

means for receiving predetermined operating characteristics of said adaptive filter ***( "The detector 254 operates to control the time that coefficient updates are performed...the detector receives as inputs the $R_{in}$ signal on line 202, the $S_{in}$ signal on the transmit path line 204 prior to the summing node 212, and the $R_{es}$ signal on the transmit path line subsequent to the summing node", see column 9, lines 17-22; "Effective update control operations are highly useful in an echo canceller implementation to suitably determine when the adaptive filter is to adapt, and to correct performance when the path changes too quickly for the adaptive filter", see column 9, lines 33-35)***.

means for sending a control signal to control the operation of an echo canceller based upon determination of whether near and far signals have predetermined characteristics and operating characteristics ***(The echo canceller uses a double-talk detector 254 to determine when to update the transfer function for the adaptive filter, see column 8, lines 46-54; The double-talk detector can permit adaptive filter updates or can block adaptive filter update by sending an inhibit signal to the adaptive filter via inhibit line 292, see column 9, lines 14-16)***.

Regarding **claim 14**, with the features in parent claim 13 addressed above, Hemkumar discloses wherein control signal indicates adaptation of the adaptation filter should be frozen ***("If the ERLE ratio is greater than THLD...the comparator does not generate an inhibit signal that is applied", see column 13, lines 45-49)***.

Regarding **claim 15**, with the features in parent claim 13 addressed above, Hemkumar discloses wherein the control signal indicates that the operation of the

adaptation filter should be suspended ***("Otherwise, the ERLE indicates that the echo canceller performance is not suitable so that an inhibit signal is generated that inhibits updating", see column 13, lines 50-53)***.

Regarding **claim 16**, with the features in parent claim 13 addressed above, Hemkumar discloses wherein the determination means uses a high-pass filter ***(see figure 1, element 126; "The signal generated by the network input high-pass filter is processed to determine a parameter, called the far-end input power...that is used in suppression", column 5, lines 33-35; "The signal generated by the acoustic input high-pass filter is processed to determine a parameter, called the near-end input power", see column 6, lines 24-26)***.

## *Conclusion*

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patent is cited to show the state of the art with respect to echo cancellers

US Patent (4,970,715) to McMahan

US Patent (6,347,141) to Klein et al

US Patent (6,563,803) to Lee

EPO Patent (EP031055A1) to Vairvan

The following patent is cited to show the state of the art with respect to divergence of signals in echo cancellers

US Patent (6,560,332) to Christensson et al

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Nguyen whose telephone number is 703-305-0369. The examiner can normally be reached on 8am-5pm ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 703-305-4798. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

AVN
October 31, 2003

RICKY NGO
PRIMARY EXAMINER